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GEOGRAPHICAL VARIATION IN THE SONG OF THE  
RUBY-CROWNED KINGLET.

BY ARETAS A. SAUNDERS.

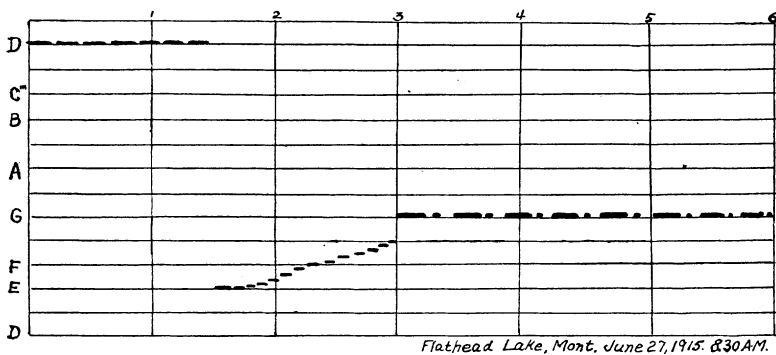
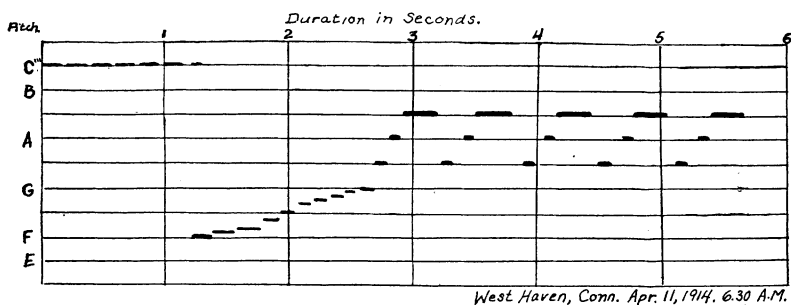
VARIATION in bird song may be individual, local, seasonal, or geographical. Individual variation is by far the commonest form, and is well illustrated in the Song Sparrow (*Melospiza melodia*), a bird whose song seems to hold the same general characteristics everywhere throughout its range, and yet is so variable that no two individuals ever sing exactly alike. Local variation may be found in many species. I have heard greater differences in the songs of Field Sparrows (*Spizella pusilla*) in two Connecticut localities, not more than twenty miles apart, than there is between the average Connecticut bird, and those of Pennsylvania or Alabama. Seasonal variation is well illustrated in the Blue-winged Warbler (*Vermivora pinus*), the differences between the early and late songs of this species being well known. True geographical variation, however, seems to be much rarer than the other forms. Pycraft states that such variation "has often been denied, but nevertheless . . . would seem to be true."<sup>1</sup> In my own experience there has come but a single certain case, that of the Ruby-crowned Kinglet (*Regulus calendula*).

I have already published some facts concerning this variation (Auk, XXVIII, p. 48, and Condor, XIV, p. 31), but wider studies since then have led me to believe the fact worthy of description in a more extended article. In general, there is a distinct, certain, and constant difference between the songs of the Kinglets migrating through eastern United States, and undoubtedly breeding in eastern Canada, and those breeding in the northern Rocky Mountains. The complete geographical limits of each form of song I am unable at present to work out. I have observed the eastern song in Vermont, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, and Alabama, and on the part of a few

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<sup>1</sup> A History of Birds, p. 166.

migrant individuals, in Montana. The western song I have observed entirely in Montana, but since it ranges over the whole western half of the state there, extending from the Yellowstone Park to the Glacier Park, and including both sides of the continental divide, it probably covers a much greater range than this, perhaps the entire Rocky Mountain range of this species. Which



TWO SONGS OF THE RUBY-CROWNED KINGLET SHOWING  
GEOGRAPHICAL VARIATION.

form the song of the Pacific coast subspecies resembles, if either, I have no means of knowing.

I have illustrated the differences in the two forms of songs by samples I have collected, recorded by the graphic method (See Auk, XXXII, p. 173) with the hope that these illustrations will make

this difference clearer than mere verbal description could. In general, the song of the Ruby-crowned Kinglet consists of three parts. The first part is a series of faint, high-pitched notes, rather squeaky in quality. The second part is much lower in pitch, sometimes more than an octave, and consists of a series of short, chatter-like notes. The pitch of these notes usually rises slightly. The third and final part of the song is the loudest and most conspicuous, as shown by the heavy lines in the record. It is in this part that the variation occurs. Eastern birds sing it as a series of triplets, the notes of each triplet rising in pitch, and the last note accented, that is, both loudest and longest in duration. Western birds sing a series of double notes, all on the same pitch, the first note of each double being the accented one. Both eastern and western birds sometimes omit the first two parts of the song, and sing the third part only. When the western bird does this the song strongly suggests a common call of the Tufted Titmouse.

Glancing at the illustrations of these two songs, the main differences in them are at once apparent to the eye, as they are to the ear, of one who listens to the singers. A more detailed examination will show other differences in these two songs, but these are differences that are merely individual. As they are not at once apparent to the eye in the illustration, so they are not noted by the ear in the field, unless one makes a careful detailed study of the song.

While there is much variation among individual Kinglets in the rendering of their songs, I have never heard a song in eastern United States that resembled that of the western bird. In the same way I have never heard a bird on the breeding grounds in the west sing in a manner resembling the song of the eastern bird. In the spring of 1910 I did hear the eastern song from a number of birds that were migrating in Silver Bow County, Montana. These birds were all in clumps of willow bushes in the Transition zone, a place where this species may be found in numbers during the migrations. But in the fir forests of the Canadian zone, where this species breeds, the birds without exception sang the song of the western bird. This same statement will apply after seven summers of experience on the breeding grounds of this species in the mountains of Montana.

To name a new subspecies on the basis of a difference in song

would be a rather novel proceeding. The difference would be fully as great and as important as the differences on which many subspecies are named today, but they would be less tangible to the collector, who in most cases would have to depend on the locality to label his subspecies. I am rather of the opinion that the Rocky Mountain birds differ slightly from the eastern ones in plumage as well as in song. The naming of a new subspecies, however, if grounds for such, based on plumage or measurements, exist, I would prefer to leave to someone who has greater opportunities to study series of skins and to work out such problems.

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## THE EVOLUTION OF BIRD-SONG.<sup>1</sup>

BY FRANCIS H. ALLEN.

THE evidence and arguments brought forward by Mr. Chauncey J. Hawkins in his paper on 'Sexual Selection and Bird Song' in 'The Auk' for October, 1918, make it seem very probable that bird-song had its origin — its first cause — in the "maleness" of the males. Mr. Hawkins fails to show, however, how the multiplicity of songs of the various species of birds, the extremely elaborate songs of some, could have acquired their present forms except by some continuous selective process.

Mr. Hawkins concludes his paper by saying (following Brooks) that "any variations in voice which might arise would be preserved in the male germ which assures the variation in the species, while the germ of the female guarantees the constancy of the species." I suppose this to mean that *all* variations that have arisen in the course of the evolution of a species are present potentially in the male germ, but that some of them are inhibited by the conservative action of the female germ. This seems to be going a little beyond the evidence, and it can, I think, only be regarded as a

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<sup>1</sup> Read, in somewhat different form, before the Nuttall Ornithological Club, May 5, 1919.